THE *Cane Growers'* QUARTERLY BULLETIN

VOL. XXI., No. 2 1 OCTOBER, 1957

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BUREAU OF SUGAR EXPERIMENT STATIONS
BRISBANE

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The
Cane Growers' Quarterly Bulletin

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Cowpeas Resistant to Wilt

By A. G. Barrie

Probably the feature which has been most responsible for the decline in popularity of cowpeas as green manure crops has been their susceptibility to "wilt". This is a disease caused by a soil fungus, which has been isolated and identified as *Phytophthora sp.* The fungus enters the roots and very quickly goes throughout the plant, causing first a wilting and then death. The disease is generally more prevalent in poorly drained soils. Once the wilting has started in a field it spreads out quickly

Fig. 23—The effect of "wilt" on a well-established legume crop.

Both a *Phytophthora* and a *Fusarium* have been found responsible for wilting in plantings of cowpeas in Queensland cane fields. The occurrence of the two pathogens provides an explanation for anomalous behaviour in the one variety from one district to another, *e.g.*, C.P.I.9247 which, according to Mr. Barrie, is susceptible at Meringa, but which is apparently quite resistant at Mackay. It also explains why Reeve's Selection which is resistant to *Fusarium*, was resistant to wilt at Meringa when first introduced but later when the *Phytophthora* had become established, suffered from wilt. This present paper is concerned with wilt due to *Phytophthora*, although it is possible that some *Fusarium* effects may also be present. C.G.H.

from the focal point and can cause serious losses in susceptible varieties. The internal symptom, seen by slicing a stem, is a blackening of the tissue.

The picture presented by the commercial varieties grown at present is not very bright in regard to resistance to wilt. Poona pea is very susceptible to the disease while Cristaudo, Giant and Reeves Selection, although possessing some resistance to the disease, do lose a high proportion of their plants under severe conditions. A project at the Northern Sugar Experiment Station is aimed at breeding varieties which have wilt resistance combined with other desirable features essential for commercial cowpeas. In connection with this a trial was designed to test eighteen varieties which could have possible use as parents in the breeding work. A second aspect was also incorporated into the trial, and this was to determine the influence of the age of the plant on the incidence of wilt.

The trial was located on a low lying portion of a block on the Northern Sugar Experiment Station on which wilt had occurred in past years. The first planting was made on the 4th December and the second was made two weeks later. The wet season started just after Christmas and, by mid-January, approximately 30 inches had been recorded, this providing excellent conditions for wilt.

The results of the trial are given in Table I. The varieties have been divided roughly into three groups—resistant, moderately resistant, and susceptible.

TABLE I

Percentage survival of plants: two replications per planting

Variety	First Planting	Second Planting	Average	Classification
Black Eye No. 5	100	100	100.0	
C.P.I.12153	100	100	100.0	Resistant
C.P.I.9259 G.	100	100	100.0	
Malabar Pea	95	66	80.5	
C.P.I.9259 P.	77	80	78.5	
C.P.I.8085	90	50	70.0	
C.P.I.8086	85	55	70.0	Moderately
Soutter	100	20	60.0	
Black	93	20	56.5	Resistant
Reeves Selection	63	50	56.5	
C.P.I.9432	35	55	45.0	
Clay Pea	55	10	32.5	
C.P.I.10753	10	0	5.0	
C.P.I.9247	5	5	5.0	
Brabham	5	0	2.5	
Groit	5	0	2.5	Susceptible
Poona	0	0	0	
C.P.I.9248	0	0	0	
Average	56.6	39.5	48.0	

The resistant group consists of Black Eye No. 5, C.P.I.12153 and C.P.I.9259 G. These varieties did not lose a single plant during the wet weather, at either time of planting.

The moderately resistant group contains varieties which had an average survival between 30 and 80 per cent. There is a large range in this group but, under the conditions of the trial, in which there was a good deal of variation between similar treatments, small differences cannot be regarded as significant. Malabar Pea and

C.P.I.9259 P. head the group, while the commercial variety Reeves Selection is well down the list. Probably the upper half of this group would survive well under less severe conditions of wilt.

The susceptible group had a survival rate of five per cent. or less. It included Poona pea which lost all plants through wilt. The varieties in this group have little or no resistance when conditions are very favourable for the disease. C.P.I.9247, which has other good qualities, has produced very good crops where the wilt has been slight or non-existent. However, since it is impossible to forecast the severity of the conditions, varieties of this type are of little commercial use.

The varieties Black Eye No. 5 and Malabar Pea have shown good growth for a number of years and they have been released to the seed growers. Seed supplies for farmers should be available in the near future. These will provide a welcome replacement for Poona pea and Reeves in the wetter areas.

The second point emerging from the trial is the difference in amount of wilt in crops planted at different times. The early planted cowpeas had an average of 56.6 per cent. surviving the wilt, while the later ones had only 39.5 per cent. surviving. The influence of the time of planting is most noticeable in the moderately resistant group. Soutter is a very good example of this as it was completely resistant in the first planting, but had only 20 per cent. surviving in the second planting. It is obviously essential to plant this type of cowpea as early as possible to avoid the effects on very young plants. Complete resistance is aimed at in the breeding project, as the main usage of cowpeas has been for late planting, and there is always the likelihood of wet weather on young plants.

The trial has shown that there is a wide range of resistance to wilt exhibited by different cowpea varieties. It is pleasing to find some completely resistant varieties which can be used in the breeding programme, and hence increase the likelihood of obtaining resistant varieties with good growth characteristics. The trial also demonstrates that the two new varieties, Black Eye No. 5 and Malabar Pea, contain considerably more resistance to the disease than the widely grown Poona pea and Reeves Selection. Cowpeas planted late, which are only a week and a half old when the wet weather commences, are more susceptable to wilt than plants three weeks old.

Queensland's Major Cane Varieties

Final figures from the 1956 crop show that five varieties, between them, made up 84.7 per cent. of the total crop. Q.50, for the fourth successive year, was the premier variety, the weight of this cane crushed being 2,623,146 tons. Pindar also had over two million tons and both Trojan and C.P.29/116 exceeded the one million ton mark.

Badila, still going downward, was represented by only 468,937 tons.

Only five other varieties exceeded one per cent. of the total crop, these being Q.57 (196,298 tons), N.Co.310 (138,220 tons), Q.47 (125,981 tons), Q.58 (118,693 tons) and Ercs (95,178 tons).

Twenty other varieties were supplied in tonnages ranging from 83,678 to 2,092, the lowest figure being recorded by M.1900 Seedling, a cane which once was the major variety of the Mackay area.

Lower Burdekin Field Day Address

BY NORMAN J. KING.

In a *Cane Growers' Quarterly Bulletin* of just twenty-two years ago I found the following statement. "It is the intention of the Bureau to call a general meeting of Inkerman suppliers at an early date to consider the wisdom of temporarily disapproving B.208." Some of you recall that the reason for that emergency was the presence of downy mildew disease in the area—a disease which was devastating in its effects on susceptible varieties.

I mention this matter to-day to remind you that the Lower Burdekin was not always free of major cane diseases. Downy mildew was, at one time, a serious threat to production and if it had not been entirely cleaned up you would not be growing a variety like Trojan now. However, the disease was eliminated and for many years this area enjoyed the distinction of being the healthiest in the State. Great care was taken to ensure that any new variety being introduced from outside went through two quarantine stations and, so far as we are aware, the worst diseases of North Queensland, leaf scald and chlorotic streak, have been kept out of the three local mill areas.

So enthusiastic did your local Disease Boards become in planning for an entirely disease-free area that they tackled the minor mosaic problem, and successfully dealt with it in short time.

There are considerable advantages in farming in a district where cane diseases do not raise any problems. For example, if a new variety is satisfactory from the agronomic point of view it is not held back, as happens sometimes in other areas, because of susceptibility to a disease. Your expenditure on disease inspections, digging out diseased stools and purchasing clean plants, is very much reduced. And you do not have to face the problem of ploughing out diseased fields to prevent spread into adjacent cane. And finally you do not suffer the crop losses frequently experienced by your counterparts in other, less fortunate, areas.

These advantages should be valued by the growers in this district, and each farmer should do his very best to ensure that the benefits of freedom from disease are not jeopardised by any careless actions. Just recently we had reported to us that a canegrower in the Lower Burdekin introduced some cane plants from the Ingham district where leaf scald and chlorotic streak are both present. Maybe this was a thoughtless action but it is fraught with such risk to the crops of this area that I can assure you we will prosecute the grower concerned if we can collect the necessary evidence. There is no advantage to be gained by introducing plants of a variety already approved here, and if the variety is not approved here then the farmer cannot grow it and the miller cannot accept it for milling.

In this talk I have not yet made reference to ratoon stunting disease which was a new discovery of recent years. This is known to be present in every district of the State and in practically every canegrowing country of the world. How long it has been present in our crops we do not know and its very obscure symptoms are the explanation of its not being detected earlier. Here again the local Disease Boards were well to the fore in implementing the control measures which had been developed by the Bureau and I feel confident that with a continuation of the energetic and enthusiastic work by the local supervisors the disease will be eliminated eventually.

The symptoms of ratoon stunting disease are not very clear cut in any area, but in the Burdekin they are even less definite because of irrigation

and the lack of any pronounced check in growth. For the same reason the stunting which characterises the disease is not so marked. But even though crop losses are light the incentive to eradicate the disease still exists; newer varieties may be more susceptible to the disease than are the existing ones. There is some slight evidence that there may be different strains of the ratoon stunting disease virus and that, in the Burdekin, you have a less virulent strain than elsewhere. If this finding is confirmed, it will be a fortunate circumstance, but we must not relax our efforts at eradication because viruses have the bad habit of mutating and next year you may have a strain which causes more serious losses.

Constant vigilance is essential in disease control. The clean area of today becomes the diseased one to-morrow if care is not taken to maintain the defences in good order. Last year the Giru district was free of all diseases except ratoon stunting, but in the twelve months just past chlorotic streak has been found on several properties. That is getting too close to these areas to be comfortable. Your Disease Board supervisors in Ayr and Inkerman are your best insurance against an outbreak of any serious disease. Their constant inspections tend to discover any abnormalities in the crop and you are urged to draw their attention to anything unusual you may see on your farms.

In recent times the supervisors and our own staff have found several minor diseases affecting small areas of cane. Some of these maladies are minor in extent but major in their effect on growth.

It is our duty and that of your supervisors to ensure that these small outbreaks do not spread. So, I repeat, make sure to report all unusual crop performances to your supervisor or our officers. There is nothing to lose and much to gain. In particular you should advise us of anything abnormal on badly drained land. It is there that chlorotic streak is most likely to show up if it gets into this area—and I would emphasize the fact that Ayr and Inkerman are the only two districts in the State where chlorotic streak has not yet been found. An early report of a disease gives some chance of speedy eradication, whereas if it is allowed to spread and planting material is used from it the chances become progressively less.

Industry Progress

From year to year the sugar industry is generally able to point to some progressive step towards its target of high efficiency. Some years it is a new cane variety which promises to be superior to an older one; at other times a big step is recorded in disease or pest control; and yet again the year is marked by increased crushing rates or higher efficiencies. For the year just passed the major item of progress was undoubtedly the completion and successful operation of the bulk sugar terminal at Mackay. This first step in ultimate mechanization of raw sugar handling is a real milestone in our history.

An Approach to Water Conservation

By C. L. Toohey

The problem of ensuring an adequate water supply to such a moisture hungry crop as sugar cane is an everpresent, and at times, an exceedingly worrying one. In the southern sugar districts of Queensland this year the problem has been severely, and even tragically, underlined.

With the failure of the normal wet season to eventuate, those fortunate enough to possess irrigation systems had the means of, at least, maintaining crop growth. Not every farmer was in such a favourable position, many being precluded by unavailability of underground water, or by the heavy financial cost of locating and equipping a satisfactory source of supply.

An illustration of the value of surface water conservation has been given by Messrs. Fowkes and Murchie of North Gooburrum. Although already pumping from two bores on the property, it was decided to take advantage of a natural waterway running through the property which backs on to a small ridge.

An earthen dam of clay and sandstone was constructed across the base of the gully for seven chains and this extended back towards the ridge for 11 chains. The floor of the dam sloped to a maximum depth of 45 feet at the retaining wall, giving a total area of 7.5 acres with a capacity of 25,000,000 gallons of water. A survey of the catchment area for the dam revealed that this was approximately 200 acres.

In the construction of the dam, all top soil was removed and stockpiled. On completion, this soil was replaced so that grasses could be grown to consolidate the banks. Provision was made for an overflow at the mouth of the dam, eliminating any possibility of the wall bursting under pressure from too great a volume of water.

Construction was completed by early December, 1956, and a rainfall of 13 inches in the middle of that month filled the dam to its maximum level.

One five-inch pump with an output of 25,000 gallons per hour is in use from the dam. Motive power is supplied by a 40 h.p. Turner diesel tractor. The suction pipe to the dam is equipped with a foot valve, which ensures the immediate delivery of water, without the necessity of priming, even on the second or third day after a break in pumping. Continuous pumping for eight hours lowered the dam level by three inches.

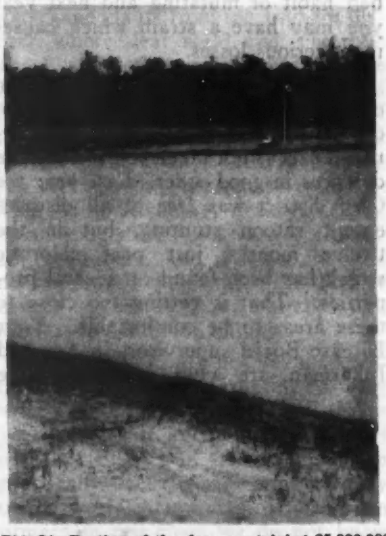

Fig. 24—Portion of the dam, containing 25,000,000 gallons of water, described in this article.

To conserve water and to maintain the dam level, thus safeguarding against drying and cracking of the walls, a 4-inch pump, delivering 20,000 gallons per hour, feeds water back from spears in the creek.

Mr. Fowkes finds that he is not limited to any pump size as with a bore, where the determining factor is the size of suitable casing. He envis-

ages a 12-inch pipeline from the dam through the centre of his farm, delivering 60,000 gallons per hour at the highest point, claiming that operating costs from surface water are considerably less than those of underground systems.

The total cost of the dam was £4,750. This included £1000 as the cost of clearing ten acres. Once established, maintenance costs will be very low.

The value of the dam is shown by the fact that two blocks, inaccessible to irrigation from the bores, will now produce reasonable crops. Water is pumped through 13 chains of fluming to the highest point of the blocks and fed by gravity to the various sections. The only limiting factor on the use of the dam is the unavailability of fluming at the moment.

Although confined in scope to properties possessing suitable watersheds, the value of water conservation in dams such as described above is a very real and worthwhile consideration on properties that lend themselves to such schemes. The tonnage of water run to waste during the wet season in existing gullies and small creeks in the southern district must amount to a phenomenal figure.

Aerial Spraying Campaign—Ingham

Aerial spraying of cane crops in Queensland gained momentum with the recent successful spraying of some 1,400 acres of the Herbert River cane crop. This campaign was directed at weed control, particularly of those vine weeds—*convolvulus spp.* and *Star of Bethlehem*—which have proved readily susceptible to the hormone type weedicides. Initially organised by two local growers in conjunction with Agricultural Aviation Ltd., the spraying commenced during the first week in February. The successes obtained with the first blocks treated encouraged further orders from other growers and the operations quickly snowballed to cover some 25 farms, thereby extending the campaign into the third week of February.

Under the prevailing local conditions the cost averaged 30/- per acre plus cost of material; the weedicide used was the sodium salt of 2,4–D applied at the rate of one pound per acre. In this connection it should be realised that actual spraying costs are dependent on air distance between 'drome and farm. These may be reduced by the use of temporary air strips at centralised points where large acreages are to be sprayed. The aircraft capacity was up to 50 gallons per flight and a spraying rate of 5 gallons per acre was used.

Spray coverage was good particularly in those blocks where vine growth was well advanced and, even where the leaf height was greater than 6 feet, only a small percentage of freshly germinated interstool weeds remained unaffected. A survey of treated areas made during the first week in March verified the effectiveness of this method of spraying in fields where susceptible vine weeds have assumed pest proportions. All growers participating in the venture have expressed satisfaction with the results achieved, and the success of the local campaign foreshadows the extension of aerial spraying of Queensland cane fields.

O.W.D.M.

Sterilizing Cane Knives for the Control of Ratoon Stunting Disease*

By D. R. L. Steindl

During recent years a considerable amount of experimental work has been carried out on the use of chemical disinfecting agents for the sterilization of knives and other equipment which have become contaminated with ratoon stunting disease virus.

Early work on the subject showed that a number of common disinfectants such as methylated spirits, bleaching powder, "Dettol", formalin, "Lysol", mercuric chloride, "Mirrol", phenol, "Phenyle", potassium permanganate, and "Zephiran", inactivated the virus when added to diseased juice in sufficient concentration. However, it does not necessarily follow that these materials will sterilize knives which are coated with a layer of dried juice and dirt, in which the virus is embedded, and further work was necessary to determine just what treatment these contaminated knives required in order to render them sterile.

Apart from the ability to inactivate the virus, a suitable disinfectant should be relatively cheap, non-corrosive and not unduly unpleasant to handle. Mirrol, Lysol, Dettol and Phenyle fulfilled these conditions and were therefore selected for further trial. Cane knives which had been contaminated by cutting up diseased cane until they had a tacky coating of syrup and fibres were used in all experiments.

At first these knives were simply soaked for a short period in the solutions to be tested, then used for cutting setts from healthy sticks of Q.28. However, plants developing from some setts cut in this manner eventually developed the disease, indicating that the method of sterilization was not complete.

In subsequent experiments the contaminated knives were either swabbed with a dish mop, or scrubbed with a brush in the solutions to be tested until free from any obvious adhering matter, and then left in the respective solutions for periods up to five minutes. They were then used for cutting setts of healthy Q.28 which were planted and grown to maturity before final observations were made.

Concentrations of materials used in these experiments were:—

Mirrol: .05, .1, .275, .5 and 1 per cent.
Lysol: 1 and 2 per cent.
Dettol: 1 and 2 per cent.
Phenyle: 2.5 and 5 per cent.

The concentrations of Mirrol were based on the percentage of active ingredient, while the others were based on the commercial product.

Times of treatment in the solutions after swabbing or scrubbing varied from three seconds to five minutes. Three knives were used and ten setts cut for each treatment.

Results showed that these knives were effectively sterilized when they were scrubbed or swabbed in solutions of a minimum strength of 0.1 per cent. Mirrol, 1 per cent. Dettol or 2 per cent. Lysol, and then soaked in these solutions for a period of not less than one minute.

Cleaning of the knives by some form of scrubbing action is most important, otherwise the virus can be protected by the coating of sugar and dirt which accumulates on the knife. This coating is not removed by a comparatively prolonged soaking. In practice the time of treatment should be at least five minutes to ensure a good safety margin in the sterilizing process.

The sterilization of cutter-planter knives still presents difficulties in that the knives are not always easily accessible for cleaning. In such cases, the use of boiling water or burning with methylated spirits would be a more reliable method of sterilization.

* A paper read at the Conference of Cane Pest and Disease Control Boards.

Poisoning of Foxes

By N. McD. Smith.

Successful poisoning of foxes over a long period depends on frequent changes in the method of baiting, and the type of material used for bait.

At Bundaberg, damage to canefields from the pest fluctuates considerably, depending on the season. Some farms, however, receive regular attention from foxes, and losses of economic amounts occur in fields of Q.50, which is the variety most favoured for attack. Trapping has never been tried to any extent, but in 1953 an interesting protective measure, using an electric fence, gave excellent results. Three strands of plain wire were rigged at intervals up to two feet from the ground and an electric impulse outfit, similar to the usual electric fence set up, provided "live wires". The enclosed field was satisfactorily protected and a pad around the fence was easily seen where the animals had scouted the barrier, seeking a break. However, this method offered only individual protection and resulted in greater damage to other fields. Therefore, baiting with strychnine offered the best chances of eliminating damage.

As mentioned previously, a change in bait is all important, and fish was found to be more enticing than partly cooked pork, raw sheeps' tongues, raw kidney and fowl.

The method of preparing the fish was to obtain bodies from which fillets had been removed and cut each into three sections—head, middle and tail. The pieces were then placed in the freezing chamber of a domestic refrigerator until frozen solid. On removal the pieces were separated and one small cut made in a fleshy part of each bait. Three to four grains of the crystal form of strychnine were placed in the cut and the baits distributed partly buried in the ground while they were still in the frozen state. The advantage claimed for the freezing was that thawing removed much of the smell of human handling and rendered the fox less suspicious.

The take of baits will decrease after a short while and a change of material will be necessary. Fowl carcases are rated next to fish, according to local experience, and the three to four grains of strychnine are introduced into an incision at the head and at the tail. There appears to be a better killing effect if the body is warm at the time of poisoning. However, a check on kill is difficult to assess using fowl bodies, for the fox often removes a large food piece to a harbourage where it is eaten at a later date.

Concerning other attractive bait material, there are many variants, and trials will establish something which will be temporarily satisfactory. A case comes to mind of an animal which avoided all classes of bait, but eventually succumbed to rotten eggs which were buried with very little cover near the regular track into the canefield.

Placing of baits involves a knowledge of animal tracks into the farm and can be determined by an inspection of headlands, etc., for paw marks and lining up damaged cane patches with likely harbourages. The number of baits laid must be counted for safety's sake and also to learn when to change to something different when the take drops off and damage still occurs. The number laid over an area depends on variable factors, but the distance apart for fish baits is every three to four paces in an area of damaged cane.

Where poisoning is being carried out it would be advisable to display a notice to this effect in conspicuous places on the farms concerned, and as an act of courtesy, neighbouring growers should be advised to chain up their dogs. The strictest precautions should also be observed in storing the poisons and baits away from the reach of children.

To Mackay and District Cane Growers

The new office-laboratory building at Mackay Sugar Experiment Station was opened by the Hon. H. H. Collins (Minister for Agriculture and Stock and Chairman of the Sugar Experiment Stations Board) on May 23rd, 1957. This was the occasion of the Annual Field Day at Mackay Station, and the gathering of some 500 growers and millers provided a suitable occasion for the function.

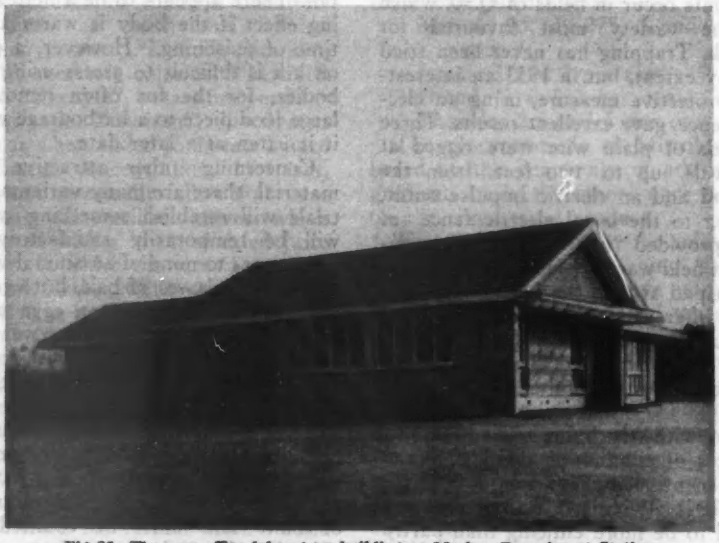

Fig 25—The new office-laboratory building at Mackay Experiment Station.

The building, of some 4,000 sq. feet in floor area, is modern in design, and replaces the old woden structure which has served the requirements of the Station staff since the establishment of the Bureau in 1900. There is sufficient office space for the foreseeable future and the soils laboratory is equipped with the latest devices for rapid soil analysis. Mackay growers should benefit considerably from the new services made available to them in the agricultural field and it is apparent even at this early date, that more interest has already been aroused in soil treatment and the nutrition of the crop.

But a service can be of benefit only if the community take advantage of it, and growers are urged to make this centrally placed laboratory their point of call for all advice on cane growing matters.

N.J.K.

Poor Ratooning in the Bundaberg Area*

By R. B. Moller

(1) *Poor ratooning in relation to Rhyparida dimidiata, Baly., and Rhyparida morosa, Jac.*

R. dimidiata.

Larvae of the plant-eating bettle *R. dimidiata* (family *Chrysomelidae*), have caused damage to both plant and ratoon cane in certain localised parts of the Bundaberg district during the past few years. In this period considerable insect population build-up occurred, probably as a result of favourable climatic conditions, and during the past season damage was more widespread than in any previous year.

The adult, a light-brown beetle approximately one-third inch in length, emerges during late December and January and may be observed during the day sheltering beneath loose bark on blue gum and Moreton Bay ash trees. During daylight the beetles are very sluggish and when disturbed merely drop to the ground. At dusk, they become active and quickly leave their resting places. The destruction of the foliage of blue gum and Moreton Bay ash trees is generally a good indication of the presence of *Rhyparida* adults, which prefer to feed on the leaves of these trees. However, they have also been observed to eat the leaves of bloodwood and mahogany, but not those of the ti-tree which also grows in the same environment. When kept in suitable containers in the laboratory, beetles feed only during the hours of darkness.

Observations on this beetle have been confined to a period of less than two years, but the indications are that there is a life cycle of one year, with no overlapping of generations. Adults have been observed only during the summer months of both 1956 and 1957. Up to the time of writing (20/2/57) diggings have failed to locate eggs in the field. Very little is known regarding the duration of the egg stage, but there seems to be some temporary suspension of development, probably in the egg stage, because tiny larvae were not seen in the field until July. As the larvae increase in size they become creamy white in colour with an orange-brown head. When fully grown they are approximately three-eighths inch long. Pupation takes place in the soil or in the chewed-out shoot during December and January.

Greatest damage from this pest develops in ratoon cane in which the larvae burrow into the young shoots and chew out the growing points at the spot where the shoots curve away from the old stubble. If the grub population is sufficiently large all growing points are destroyed and the stool dies. Even in badly damaged areas, one or two shoots per stool generally escape the activities of the larvae and develop to maturity.

Field occurrence tends to be patchy but areas several acres in extent have been virtually destroyed in the South Kalkie area. *Rhyparida* has persisted in certain localised areas for several years, resulting in continued reduction in ratoon yields and necessitating premature ploughouts. Damage generally develops in the moister, lower lying areas, although it is not exclusive to these situations.

As far as is known, autumn plant cane has not been damaged by *Rhyparida* larvae, probably because the stool has been formed before the larvae become sufficiently active. However, certain spring plant fields, particularly replants, have been severely damaged.

BHC, aldrin and dieldrin are under investigation for the control of this pest. Since the larvae are in intimate contact with the stool it is considered that preventive measures offer the best chance for crop protection.

* A paper read at the Conference of Cane Pest and Disease Control Boards.

R. morosa.

Larvae of *R. morosa* are more widespread than those of *R. dimidiata* and the damage they cause is similar but less concentrated.

The adult is a shiny, black beetle approximately one-quarter inch in length. During the summer months these beetles can be observed feeding on the leaves of cane and a number of grasses. This insect has been recognised as a minor pest of sugar cane for many years but populations seem to fluctuate considerably.

(2) *Poor ratooning in relation to Chiromyza rubriceps Macq.*

Large numbers of soldier fly larvae, *C. rubriceps* (family *Stratiomyidea*), were found associated with some of the poor ratoons at Bundaberg towards the end of the 1956 harvesting season. Since then larvae have been found in most blocks of poor ratoons, except those obviously caused by *Rhyparida spp.* Occasionally *Chiromyza* and *Rhyparida* larvae are found together. Soldier fly is not a new pest of sugar cane, having caused considerable damage to ratoons at Fairymead in the early 1930's. It has been recorded from time to time in other parts of the sugar belt.

The larvae are yellow-brown in colour with a thick, leathery integument which carries many stiff bristles. A variation in length of field-collected specimens from one-twelfth inch to three-eighths inch has been noted. The larval stage is the only one which has been observed this season.

The adult soldier fly is small and black, three-eighths to half inch in length with smoky-brown wings, conspicuous red head and large, prominent, black eyes. The eggs, which are very susceptible to desiccation, are laid just beneath the soil surface soon after the flies emerge. The young larvae attach themselves to the roots of cane or various grasses from which they obtain nourishment by sucking. The larval stage possibly occupies 12 months after which pupation takes place about one-quarter inch below the soil surface.[1] Two broods of flies (April-May and November) have been observed in New South Wales, but only the April-May emergence has been recorded at Bundaberg and Mackay.

Affected fields exhibit a patchy appearance with apparently normal stools dotted here and there throughout the poor ratooning areas. These are fairly clearly defined, there being little or no gradation from poor to good ratoons. Patches vary in size from a few stools up to an area several acres in extent, but outside rows and end stools always ratoon normally even though soldier fly larvae are frequently located beneath these stools.

Quite frequently stools are killed, but it is more common for one or two spindly shoots to develop from buds at or near the soil surface. With the development of secondary shoots a stool forms, but this stool is always well behind the rest of the field. In extreme cases below-ground buds remain apparently healthy, but completely dormant, and the stool eventually dies.

Although poor ratoons may occur at any time during the harvesting season, the majority are confined to the first few months, at which time fields of vigorous ratooning varieties, *e.g.*, N.Co.310 and C.P.29/116, have been known to fail completely. As conditions become more favourable ratoons seem to escape damage and may produce 100 per cent. stands even in the presence of soldier fly. These ratoons are generally slower than would normally be expected.

Larvae are generally found in close contact with cane stubble but may be several inches away, in contact with cane roots. They are also found under grasses in pastures and along roadsides. No mechanical damage has been observed on cane stubble and it is considered that the effect is due to a growth-inhibiting toxin injected by the larvae. Poor growth patches generally become grass-infested and when stools

eventually die, it is not uncommon to find larvae attached to grass roots.

From our limited knowledge of the life history it is evident that moist conditions from April to June are important in the building up of large populations of this insect. Normally there is considerable population fluctuation, but in recent years conditions appear to have been ideal at the critical period, and an appreciable population build-up has occurred.

Poor germination of spring plant cane has resulted from planting fallow fields in which larvae were present. Larvae attached themselves to the setts at the root band. As in ratoon cane, the effect appears to be one of inhibition of bud development.

Pupae and eggs are destroyed by exposure to dry atmospheric conditions. Therefore, it appears that the replacement of autumn plant by spring plant, together with intensive surface cultivation during autumn and early winter should result in a considerable population reduction.

BIBLIOGRAPHY.

1—King, Mungomery, Hughes 1953. "Manual of Cane-Growing", pp. 337-8.

Fig. 26—Dr. J. N. Warner and Mr. C. Grassl (on right of picture) examining cane diseases on the Bureau's Pathology Farm before going to New Guinea. On the left are Messrs. D. R. L. Steindl and O. W. Sturgess, Bureau pathologists.

A New Variety—Q70

By C. L. TOOHEY.

Included in the original seedling planting at the Bundaberg Sugar Experiment Station in 1947 were several seedlings representing the cross P.O.J.2878 x H.31-2484—the latter an Hawaiian cane. In August, 1948, one of these was selected for further trial and given the number I.70—the letter "I" indicating year of selection and 70 denoting that it was the seventieth selection made that year.

Following the normal course of events, the "I" series seedlings were then planted out in 40-sett plots and when a further selection was made in August 1949 I.70, with a brix of 19.82 against the standard variety's (C.P.29/116) 18.38, and favourable agricultural characteristics, was carried on to a yield observation trial.

The results of the plant and first ratoon crops—harvested 1950 and 1951—of this trial are quite interesting and are listed in Table I.

Now well established as a promising variety, I.70 was taken for further trial on various soil types. The results of two such trials are given in Table II.

In view of the impressive figures obtained in these trials and the excellent performances registered in various propagation plots, it was decided to release the variety as Q.70. Accordingly a brief description of the cane may be of interest, particularly to southern growers.

Stalks of Q.70 are of a medium thickness, averaging 1½ inches, and stalk colour varies from yellow-green,

TABLE I

	Plant			First Ratoon			Total	
	T.C.P.A.	C.C.S.	T.S.P.A.	T.C.P.A.	C.C.S.	T.S.P.A.	T.C.P.A.	T.S.P.A.
I.70	71.69	14.4	10.32	26.10	16.8	4.38	97.79	14.70
Q.47	40.07	13.5	5.43	17.27	15.4	2.66	51.34	8.09

TABLE II

No. 1—B. ANDERSON, Alloway—red forest sandy loam

	Plant		First Ratoon		Total	
	T.C.P.A.	T.S.P.A.	T.C.P.A.	T.S.P.A.	T.C.P.A.	T.S.P.A.
I.70	53.44	7.53	50.88	7.38	104.32	14.91
C.P.29/116 ..	46.90	5.33	44.62	6.20	91.52	11.53

No. 2—C. B. COURTICE, Hummock Road—red volcanic loam

	Plant		First Ratoon		Total	
	T.C.P.A.	T.S.P.A.	T.C.P.A.	T.S.P.A.	T.C.P.A.	T.S.P.A.
I.70	37.63	5.88	39.56	6.87	77.19	12.75
Q.50	35.72	5.53	37.18	5.96	72.90	11.49
C.P.29/116 ..	33.55	4.82	39.93	5.98	73.48	10.80

[*continued on page* 57

Fig. 27—The bulk sugar shed at Mackay harbour. Its capacity is 150,000 tons of sugar.

Fig. 28—The bulk sugar hoppers on railway lines at Mackay harbour.

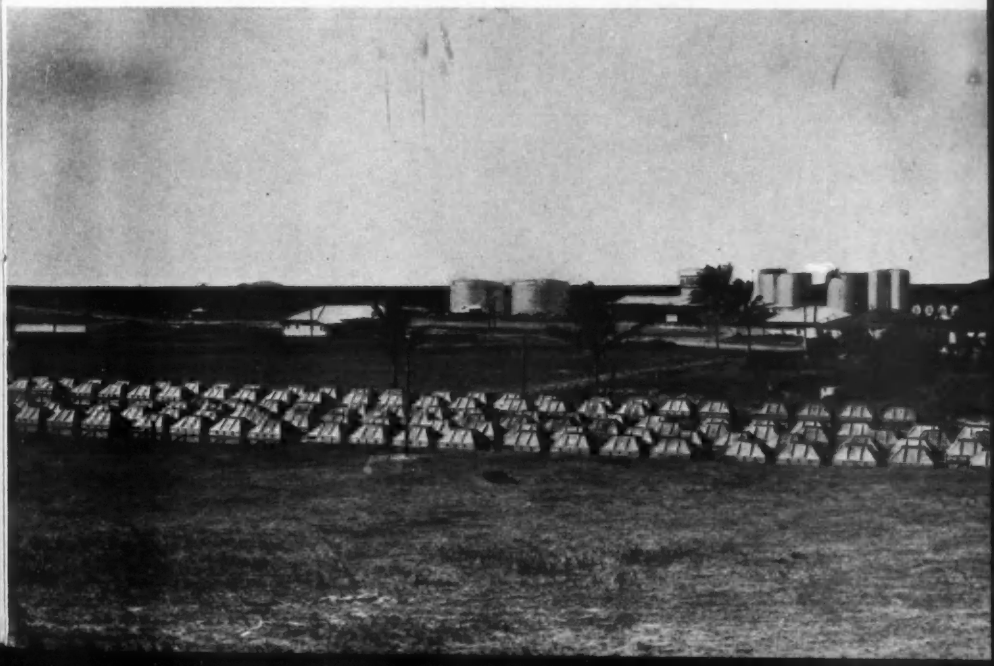

Fig. 29—Fodder cane in the Numinbah Valley, South Queensland

Fig. 30—At the Magnetic Island quarantine station. J. N. Warner (left) inspects the canes he collected in New Guinea.

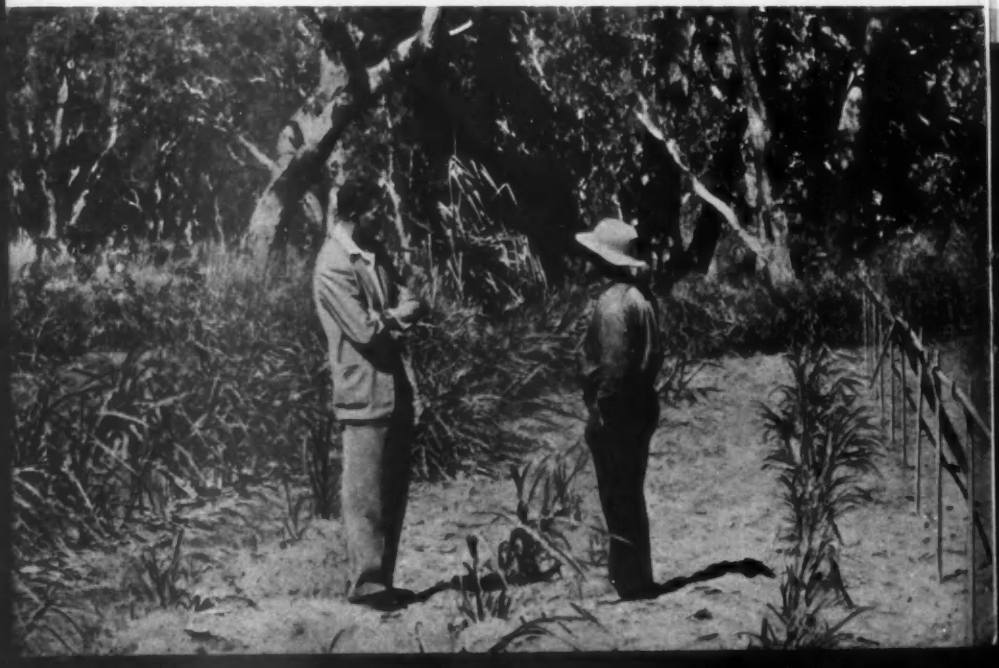

Fig. 31—A recently planted field in the Greenhill area of Cairns.

Fig. 32—Cane lands in the Freshwater and Redlynch areas.

Fig. 33—Rich cane land in the Pinnacle Flats area of Mackay

Fig. 34—Inkerman Mill through the steel framework of the new Burdekin bridge.

continued from page 52]

where trash covered, to olive-green where exposed. Eyes are round, fairly small and plump, and fit closely to the stalk, minimising risk of damage in handling.

Fig. 35—The variety Q.70 which has just been distributed in the Bundaberg district.

The top is semi-erect and has the yellowish colour of P.O.J.2878. Hairs are quite numerous on the leaf sheath. Trash is free, but lightly held to the stalk, and no trouble is experienced with pre-harvest burns.

Q.70 gives a most reliable and quick germination. Ratooning is equally good. Early vigour ensures speedy row cover, but progress slows somewhat in the autumn. However, this is only temporary and the variety makes good growth during winter. One thing should be remembered, Q.70 is very sensitive to drought conditions, and is better suited to alluvial or irrigated farms.

Stooling is compact and erect with good resistance to lodging. Stalk weight is particularly heavy and often leads to underestimation of crop. The variety is a shy arrower, and the maturity peak is reached at mid season, quality being maintained into late season. Frost resistance varies from moderate to good.

Provided Q.70 is confined to soil types best suited to it, *i.e.*, alluvials, irrigated farms, or soils which have shown good moisture retaining properties, the variety should prove a welcome addition to the commercial canes of Southern Queensland.

The "Q" Canes

Cane growers who assist the Bureau by growing experimental canes on their farms sometimes become a little confused when a seedling cane with a number they have become used to suddenly goes on to the approved list with a "Q" number which is quite different. This year when it was decided to distribute the seedling known as I.70 it was given the approved number of Q.70 to avoid such confusion. If it had taken its correct place in the list of "Q" canes it would have been Q.69.

C.C.S. Deterioration in the Burdekin Area

By G. A. Christie

The lower average c.c.s. and consequent increase in tons of cane required to produce a ton of sugar in recent years has received comment by many people associated with the sugar industry. Many factors, including varieties, seasonal conditions and differing agricultural methods, may be combining to produce this result, but it is thought that the varietal change in most areas plays the major part.

The Lower Burdekin area, which some years ago claimed the title of "The Sweetest Place on Earth", has not escaped this downward trend in c.c.s., and the analysis of figures from a typical Lower Burdekin mill shows how serious the losses are at the present time, particularly in the early part of the crushing season. Varieties supplied to mills in the Ayr district have shown a complete change over the last decade. Until the change commenced, soft, high sugar canes of noble varieties provided practically the entire crop. In recent years these have been replaced by varieties containing part wild blood, and noble canes comprise only a very small portion of the present cane supply to mills. Because of this rapid change in varieties, three 4-year periods have been selected for c.c.s. comparisons; the first 1945–48 when noble canes provided over 90 per cent. of the crop; the second, 1949-52 when the proportion of noble and hybrid varieties was roughly equal; and the third, 1953-56 when hybrid varieties provided over 80 per cent. of the crop. The annual percentage of each variety milled is shown in Table I. The outstanding features of this Table are the decline of Badila, which in 1945 provided 51.4 per cent. of the crop, but only 3.8 per cent. in 1956, and the rise of Trojan from 3 per cent. in 1948 to 62.6 per cent. in 1956. Others have shown lesser rises and falls over the same period, but the general trend is towards the greater use of hybrid varieties in recent years.

Week Ending	Mill Average C.C.S.		
	1945–48	1949–53	1953–56
June 22 ..	14.50	12.58	12.45
July 20 ..	15.02	14.44	13.52
August 17 ..	15.71	14.91	14.17
September 14 ..	16.09	15.61	14.88
October 12 ..	16.16	15.92	15.47
November 9 ..	16.02	15.86	15.51
December 7 ..	15.22	14.94	15.33
January 4 ..	13.34	14.14	14.99

The average c.c.s. for each season, while showing some irregularities in years when floods or cyclones affected crops, has decreased in the period under review, but these figures do not indicate the true position, for in that part of the crushing period when the sugar content is low, cane deliveries to the mill are below the tonnage required to keep the mill in constant and efficient operation and cane supply increases to a maximum when sugar content of crops reaches its peak.

TABLE I

Percentage of each variety milled, 1945-1956

Variety	1945	1946	1947	1948	1945-1948 Average	1949	1950	1951	1952	1949-1952 Average	1953	1954	1955	1956	1953-1956 Average
Badila	51.4	42.0	42.1	41.1	44.15	36.3	29.1	22.0	10.3	24.425	6.9	6.3	4.8	3.8	5.45
E.K.28	26.0	21.2	15.9	11.9	18.75	8.2	5.4	2.2	.9	4.175	.4	.3		.1	.2
S.J.2	9.2	8.3	5.7	6.2	7.35	4.6	3.2	2.6	1.1	2.875	.3				.075
H.Q.426 ..	7.7	7.2	4.4	3.9	5.8	2.9	3.1	2.7	2.0	2.675	1.6	1.0	.8	.6	1.0
Q.20	2.8	2.1			1.225										
Comus	1.5	5.4	10.8	9.8	6.875	9.9	11.1	1.0	8.6	9.9	6.7	5.4	3.5	2.3	4.475
2878	.4		.6	1.0	.5										
S.J.16	.4	7.1	15.7	20.2	10.85	21.6	19.7	18.5	16.7	19.125	14.1	12.1	10.2	7.3	10.925
B.208		5.7	4.4	2.9	3.25	1.6				.4	.3			.1	.1
Trojan				3.0	.75	14.0	25.6	35.1	48.4	30.775	52.9	56.9	60.8	62.6	58.3
Pindar							1.6	6.2	11.7	4.875	15.0	17.6	15.6	11.8	15.0
Q.57													3.8	11.2	3.75
Others	.6	1.0	.4		.5	.9	1.2	.7	.3	.775	1.8	.4	.5	.2	.725
Average c.c.s. ..	16.14	15.02	15.71	15.67	15.635	15.13	14.85	15.22	15.34	15.135	15.26	14.77	14.93	14.65	14.903
Cane/Sugar Ratio	6.29	6.83	6.53	6.55	6.55	6.73	7.01	6.87	6.71	6.83	6.72	6.84	6.88	6.83	6.82
		29.2	31.8	35.9	31.65	36.2	40.0	26.1	38.14	35.11	41.03	43.7	37.2	37.86	39.95
T.P.A.	29.69														

In preparing the graph (Table II) the c.c.s. for each week of crushing was obtained and the mathematical averages calculated for each of the three 4-year periods mentioned earlier (1945–48, 1949–52, 1953–56). It is evident that the averages show some irregularities, but the smooth curve shows the approximate c.c.s. throughout the average season.

This graph showing weekly average c.c.s. for each of the three 4-year periods will explain the position to those who are familiar with such a method of expressing a comparison in this way. Others, however, may prefer the differences to be expressed in figures and the following comparisons show the average at monthly intervals for the periods 1945–48, 1949–52 and 1953–56.

An examination of the graph and the above Table shows that the c.c.s. figures for the 1949-52 period are more or less intermediate between the 1945-48 and 1953-56 periods, although there is some variation in the latter part of the crushing season. Of principal interest are the averages for the 1945-48 and 1953-56 years when the percentage of noble and hybrid varieties is reversed. At the commencement of the crushing season, 1953-56 averages are at least two units of c.c.s. lower than those of the earlier period at a corresponding time. The difference is gradually reduced as the season progresses, but at the period of maximum c.c.s. (early October), the earlier period is superior to the recent period by approximately three-quarters of a unit of c.c.s. The rapid decline in c.c.s. for the 1945-48 period is evident later in the season, and the higher sugar content of recent years in the latter part of the crushing period is evident. It is of interest to note that the c.c.s. of 14.5, the average figure for the week ending 22nd June in the 1945-48 period, is not reached until some nine weeks later under the conditions of the 1953-56 group.

From the foregoing it would appear that the change from noble to hybrid varieties has been a retrograde step, but in spite of their lower sugar content, the higher tonnage per acre of hybrids gives a larger return of sugar per acre. Average cane and sugar production per acre in this mill area for the three periods under consideration are:—

Period	Average Cane per Acre	Average Sugar per Acre
1945–48 ..	31.65 tons	4.94 tons
1949–52 ..	35.11 ,,	5.31 ,,
1953–56 ..	39.95 ,,	5.95 ,,

The tons of cane or sugar produced per acre are not necessarily an indication of the net return to the cane grower, for frequently this higher tonnage is coupled with the costs of additional fertilizer, extra irrigation or the many things which do add to the costs of production. At this stage it may not be out of place to stress the fact that harvesting costs, which comprise a large section of the production cost, remain the same, irrespective of sugar content of the crop harvested. Indeed, high tonnages of cane per acre often result in lodged crops which frequently attract even higher than normal harvesting rates. Excluding this factor, it costs as much to harvest a crop of 7 c.c.s. as one of 17 c.c.s.

With this thought we may return to the graph (Table II) which shows that the sugar content of cane supplied to the mill in recent years is considerably below that of past years, particularly in the early part of the crushing season. It is suggested that cane growers may give consideration to the growing of a larger proportion of the

noble canes where suitable soils and farming conditions permit, to provide a cane supply for milling during the first few weeks of the crushing period. An improved c.c.s. at this period would increase the return to the cane grower.

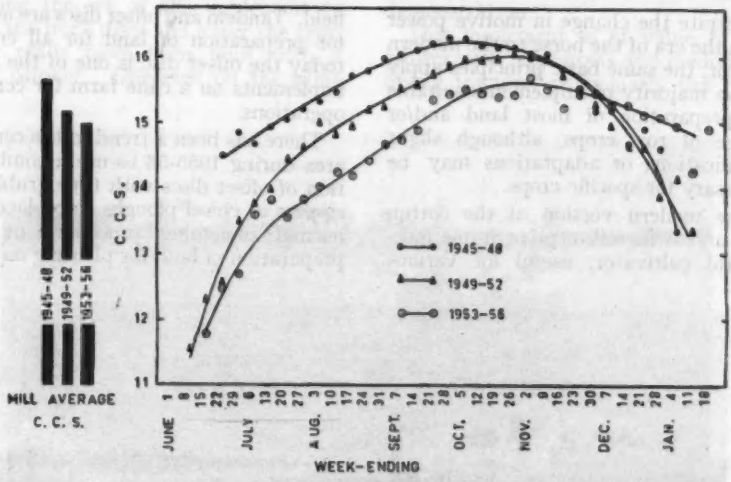

Fig. 36

Forecast of Approved Varieties for 1958

In accordance with usual practice, the Bureau has prepared a forecast of the changes it is proposed to make in the approved variety list of 1958. Any interested farmers' organizations which consider alterations should not be made along the lines indicated, or wish to submit any other changes, are invited to submit their views to the Director of Sugar Experiment Stations before 30th November, 1957. Any objections against varietal deletions, or suggestions for additions, must be accompanied by a detailed statement of the reasons for such objections or suggestions. No action can be taken in respect of late or unsubstantiated requests.

Mossman—Add Q.64 and Q.66. Delete P.O.J.2878.
Mulgrave—Add Q.66.
Babinda—Add Q.64 and Q.66.
Goondi—Add Q.57.
Mourilyan—Add Q.64.
South Johnstone—Add Q.64.
Victoria—Add Q.57.
Macknade—Add Q.57.
Invicta (north of Townsville)—Add Q.58.
Invicta (Inkerman district)—Delete S.J.2.
Pioneer—Delete S.J.2.
Kalamia—Add Q.50. Delete S.J.2.
Inkerman—Delete S.J.2.
Proserpine—Add Q.63 and Q.65.
Cattle Creek—Add Q.63 and Q.65. Delete M.1900.
Racecourse—Add Q.63 and Q.65. Delete M.1900.
Farleigh—Add Q.63 and Q.65. Delete M.1900.
North Eton—Add Q.63 and Q.65. Delete M.1900 and S.J.2.
Marian—Add Q.63 and Q.65. Delete M.1900.
Pleystowe—Add Q.63 and Q.65. Delete M.1900.
Plane Creek—Add Q.63 and Q.65. Delete M.1900.
Qunaba—Add Q.70.
Millaquin—Add Q.70.
Fairymead—Add Q.70.
Bingera—Add Q.70.
Gin Gin—Add Q.70.
Isis—Add Q.70.
Maryborough—Add Q.61.
Rocky Point—Add Q.61.

A New Tillage Implement

By C. G. STORY

Despite the change in motive power from the era of the horse to the modern tractor, the same basic principles apply to the majority of implements suitable for preparation of most land and/or tillage of row crops, although slight modifications or adaptations may be necessary for specific crops.

The modern version of the cotton king and swingtail or pivot frame foot-control cultivator, useful for various cultural operations in row crops, is now attached either underneath or to the rear or side of tractors and raised or lowered hydraulically. It does practically the same work at a faster rate.

The sugar industry has been responsible for the construction or conversion of a number of implements to suit particular requirements. It has not neglected the opportunity to take advantage of new developments in other branches of primary production. The chisel plough, devised for use in wheat lands or pastures, makes an excellent tyne cultivator or grubber in the canefield. Tandem and offset discs are useful for preparation of land for all crops; today the offset disc is one of the best implements on a cane farm for certain operations.

There has been a trend in the central area during 1955-56 to use a combination of offset discs with tyne grubbers, rippers or chisel ploughs to replace the normal ploughing procedure in the preparation of land for planting on low, wet areas. The latest importation to the canefields of Mackay is an implement from the wheat and pasture areas which is capable of performing a number of operations on a cane farm, and also reducing the time spent on land preparation, especially where large areas are concerned.

Fig. 37—The John Deere Heavy Disc Tiller operating on a Mackay cane field.

This implement is the John Deere Heavy Disc Tiller, Model 858, which has thirteen 26-inch discs with a nine feet wide cut. The depth range with discs at 10-inch spacing is three to eight inches. Each disc has a dish or cavity of four inches and the tiller is built on

a heavy frame. The large discs turn the soil well, as with a disc plough, except that the width of furrow is smaller. By altering the set of the implement to raise the front discs and lower the rear, farm roads have been built with a good camber. Operated on the same depths of four to six inches, a Caterpillar D2 tractor in second gear handled this implement comfortably during a demonstration.

This implement is of value to the grower with large areas and medium to heavy tractors, particularly the track

Fig. 38—Close up of the Tiller.

principle, bedding, and also drainage, of low wet areas is possible. An area of 15 acres of ratoons was ploughed out with this implement and very few volunteers developed. It is excellent for fallow land preparation and is capable of covering large areas in a day. For normal implement working laying type, although it is claimed that 40 H.P. wheel tractors provide sufficient traction. Its suitability or otherwise will be decided by canegrowers on the basis of initial price of the implement, economics of cane production and land usage.

Mill Crushing Rates

The twenty-six Queensland sugar mills which are members of the Mutual Control Scheme recorded an average crushing rate in 1956 of over 100 tons of cane per hour. This is a remarkable increase in a period of eight or nine years. In the 1948 crushing season the average crushing rate was only 66 tons per hour, and the present rate demonstrates that the mill capacity has advanced in step with the increased production in the field.

Another way of looking at crushing rate is to examine the weekly crushing for every mill in a single week in the season. Already this year the State's mills have handled more than 400,000 tons of cane in one week. If this rate could be maintained right through the season, the 1957 estimated crop would be handled in twenty-two weeks.

Chlorotic Streak Disease in Queensland*

By C. G. HUGHES

Chlorotic streak disease finds expression in cane in whitish streaks of irregular outline, reduced yields, poor germinations and ratoons, and increased susceptibility to shortage of soil moisture. It also may occur in elephant grass, although lack of a method of experimental transmission precludes positive identification. It has been reported from most cane-producing countries but practically always is found associated with wetter localities of poor drainage.

The disease is sett-transmitted and it is known that immersion in water at 52°C. (126°F.) for 20 minutes will render setts free from the disease. The method of spread in the field and the causal agent is not established beyond doubt, although there is one record (in Louisiana) of glass-house transmission from plant to plant by an insect closely related to the common Queensland cane leaf-hopper, and there have been many opinions expressed that a virus is responsible for the disease.

Chlorotic streak was found more or less simultaneously in Queensland, Java and Hawaii, and the identity of the disease in the three countries was established by comparison of material and discussions between cane pathologists from the three countries in 1932. The disease was first reported in far North Queensland but not long afterwards was reported from the Proserpine and Moreton areas. The subsequent spread of the disease has been sporadic and most disquieting and, at present, the only district where it has not been recorded is the Lower Burdekin. Continued inspections there have failed to reveal any chlorotic streak, but similar careful inspections over the years in other districts had also failed to reveal the disease, yet it has shown in these one by one and has then usually shown a consistent pattern of steady spread on to all the susceptible lands, despite control of planting material and many attempts to provide disease-free material. There is no doubt that the disease has occurred *de novo* in the more recently affected districts, although, of course, no one would be so bold as to claim that the quarantine measures have been so effective as to preclude all possibility of the introduction of diseased planting material.

The disease was found at Eagleby, near Beenleigh, in 1946 and has also been seen at the Woongoolba end of the Rocky Point mill area. In 1947 it was found on a single farm at Maryborough but, after the diseased fields had been harvested and ploughed out the disease was not seen again until January, 1951, when 55 farms were found to be affected.

In January, 1953, chlorotic streak was found in the Plane Creek mill area which adjoins but is not contiguous with the Mackay mills. In the next summer it was found in the poorly drained Baker's Creek catchment area in the Mackay district and despite control of planting material and the large volume of cane plants treated against ratoon stunting (which treatment is, of course, also effective for chlorotic streak) the disease is now endemic in practically every locality in the district.

The history of chlorotic streak in the Bundaberg-Childers district dates from the spring of 1955. A survey following the discovery of two stools at Childers in October of that year revealed the disease on three farms. Subsequent inspections have not as yet revealed any extension of the disease. The discovery of a single diseased stool on Fairymead Plantation in November, 1955, resulted in an intensification of the search for the disease

* Paper read at the Conference of Cane Pest and Disease Control Boards.

in the Bundaberg district but it was not until spring of 1956 that further disease was found on the Plantation. Since then it has been recorded on several farms in the new area of Moore Park, and on Bingera Plantation.

The first survey towards the end of June, 1956, by the newly appointed Supervisor revealed chlorotic streak on one farm at Giru and further inspections up until February this year have shown that at least 17 farms are infected.

At the present time the disease is known to occur in every district in Queensland with the exception of the Lower Burdekin. Its discovery in various places within recent years is, with the possible exception of Giru, not due to any failure to look for it and cannot always be associated with any known illicit transfer of plants. There's little enough known about the disease but the Bureau is concentrating on it, and it may not be a vain hope that in the reasonably near future the key to the jig-saw pieces of the puzzle will fall into our hands and everything will be clear.

An International Activity

Most important cane sugar producing countries have established breeding stations which supply a continual stream of new varieties suited to the local conditions. Because these are successful and may produce the vast bulk of the cane tonnage, as in Queensland where locally bred canes produce over 80 per cent. of the crop, it does not mean that each country becomes self-sufficient and ceases to be interested in the products of other breeding centres. The reverse is more the case and the free international exchange of varieties is a characteristic feature of the sugar world. The Bureau, acting as agent for the Queensland sugar industry — as a matter of fact it is the only organization authorised by law to trade in cane varieties—is particularly active and every year several parcels are exported or brought in from other countries. Imports during the past 12 months have totalled 31 canes which came from British West Indies, Hawaii, Java, Mauritius, Reunion and the United States of America. Several canes were also brought in from New South Wales.

Fig. 39—Ratoons of C.P. 29/116. This major cane variety came to Queensland growers through the Bureau's quarantine house.

The canes are grown for at least 12 months in the Bureau quarantine house in Brisbane and, if they remain disease-free, are then sent out to the Stations for the initial propagation plantings.

C.G.H.

High C.C.S. or More Tons of Sugar per Acre?

By NORMAN J. KING

In any discussion with cane growers on the relative values of cane varieties one usually gets onto the subject of whether a new cane with high c.c.s. is more valuable than an older one with lower c.c.s. but with more weight. It is very common to hear the remark, "But the lower c.c.s. cane still gives me more tons of sugar per acre".

The time is well overdue for an examination of what is the more profitable crop for the grower. Tons of sugar per acre is not a true assessment of profit unless other items such as harvesting costs, transport, etc., are taken into consideration. Similarly c.c.s. of cane is not a true criticism unless it is considered in relation to size of crop and the relevant costs of cutting and transport.

One way of comparing the relative nett values of the two cane varieties is to consider a production of, say, four tons of sugar per acre and to examine the value of the c.c.s. and the relative costs to achieve this target. In the following table cane has been taken at varying c.c.s. from 12 to 16, the number of tons of cane calculated to give four tons of sugar per acre, the value of the cane calculated and the cutting costs subtracted. The final column shows the net return to the grower providing that no extra costs such as haulage had to be applied.

It is a simple matter to see from this table that if a grower harvested a block of, say, Q.50 which yielded 28.57 tons of cane at 14 c.c.s. and he then harvested a block of, say, Q.57 yielding 25.81 tons at 15.5 c.c.s., the second block would have been more profitable by £6/7/4 per acre. Yet both blocks would have produced exactly four tons of c.c.s. per acre. If that grower had a haulage charge of, say, 4/- per ton to pay, the block of Q.57 would have been more profitable by £6/18/4 per acre.

If one takes the two extremes of the table, 33.3 tons of cane at 12 c.c.s. and 25 tons of cane at 16 c.c.s., both would amount to four tons of c.c.s. per acre but the 25 ton crop would give a net return to the grower £19/1/11 per acre higher.

Tons of sugar per acre is an important figure but it should not be accepted as the yardstick by which the value of a cane should be assessed. The c.c.s. figure is, within certain limits, a more important one. Every grower should work out his own profit on each cane variety of equal age, taking into consideration (a) tons of cane per acre, (b) value per ton of cane, and (c) harvesting and hauling expenses.

TABLE I

Net return from 1 acre of cane at varying c.c.s.

Tons cane required to make 4 tons of c.c.s.	Value of cane with sugar @ £47 per ton	Harvesting cost @ 15/5 per ton cane	Net return per acre
33.3 @ 12 c.c.s.	£118 6 10	£25 12 10	£92 14 0
32 @ 12.5 c.c.s.	120 7 9	24 13 4	95 14 5
30.77 @ 13 c.c.s.	122 5 5	23 14 4	98 11 1
29.63 @ 13.5 c.c.s.	124 0 2	22 16 10	101 3 4
28.57 @ 14 c.c.s.	125 12 3	22 0 5	103 11 10
27.59 @ 14.5 c.c.s.	127 2 9	21 5 4	105 17 5
26.66 @ 15 c.c.s.	128 9 10	20 11 0	107 18 10
25.81 @ 15.5 c.c.s.	129 17 1	19 17 11	109 19 2
25.00 @ 16 c.c.s.	131 1 4	19 5 5	111 15 11

Spray Irrigation at Fairymead

Bundaberg and district cane growers will hear a lot in the future of the extensive spray irrigation scheme which has been installed on the mill plantation of Fairymead Sugar Company. The sugar industry in Queensland has never been spray-conscious even in areas where irrigation water is scarce and costly. Where good water is obtainable in large quantity, where pumping costs are not excessive and where labour is plentiful there is no reason why a grower should seriously consider the higher capital outlay involved in spray irrigation. But in most areas to-day water is not cheap and labour both scarce and costly; it is particularly scarce in the spring and early summer months when irrigation is essential to ensure early growth and a resulting high sugar content of cane.

Twenty years ago the Bureau installed on a Lower Burdekin farm an experimental unit involving high pressure sprays and demonstrated the advantages of water and labour savings when compared with the normal furrow irrigation. But lack of interest at that time caused the plant to be dismantled.

In the intervening years progress in design of sprays has been rapid, and the wrought iron pipe mains which were costly and awkward to handle have been replaced by light-weight, high-pressure aluminium piping with rapid connections. These can be moved from point to point with a minimum of labour. Sprays are available which cover an acre or more of land, water furrows and cross feeders are eliminated, water can be evenly applied in any desired quantity, and there are no impediments to cultivation.

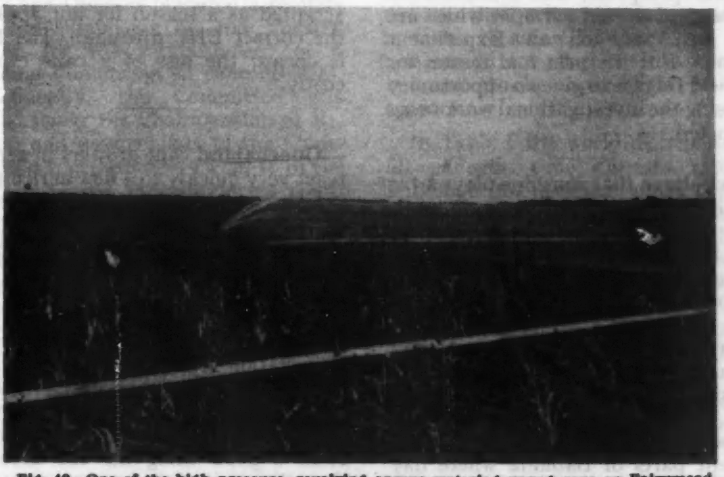

Fig. 40—One of the high-pressure, revolving sprays watering young cane on Fairymead Plantation. High-pressure aluminium fluming in the foreground.

The Fairymead installation is pioneering this method of irrigation on a large scale, and one ventures to predict that it is a system which will expand in Bundaberg in the forthcoming years.

N.J.K.

Random Gleanings

At the four Experiment Station Field Days this year the attendance totalled 1,800. This is nearly one in four of the canegrowers of Queensland and demonstrates a growing interest in the technical side of the industry. Cane growers appear to look forward to these annual gatherings where they can see all the new tractor models, argue the merits of implements on display, discuss seasonal prospects, and reminisce on the value of the old varieties which are now seen only on an Experiment Station. But the principal reason for the Field Days is to give an opportunity for seeing the investigational work being conducted.

We believe that sunshine plays a big part in producing high c.c.s. in cane. If we are correct in that assumption a lot of light will be thrown on the reason for the periodic low c.c.s. years in the wet belt. The Bureau measures the hours of sunlight every day at Meringa Experiment Station by means of a Sunshine Recorder, but no records are available for Babinda, Innisfail, or Tully. So we have arranged this year for two recorders to be installed in different parts of Babinda where day by day records will then be kept for a number of years.

The two Cane Pest and Disease Control Boards in the Invicta Mill Area (the one on the Ingham Line and the other in the South of Townsville section) are to be amalgamated into one Board. At a combined meeting of the two Boards held in Townsville on July 23rd it was unanimously resolved to amalgamate, and the meeting asked the Director of Sugar Experiment Stations to implement the resolution. This proposed combining of forces should be to the ultimate benefit of both districts by reducing administrative costs and ensuring adequate control of pests and diseases.

The serious greyback grub damage which has occurred this year on farms in the far northern and Burdekin areas, where BHC was not applied, is a salutary reminder that precautions cannot be relaxed. Bad grub years come in cycles—but not in regular or predictable ones—and the only way to guard against infestation is to treat all crops. The absence of heavy beetle flights for two or three years should not be accepted as a reason for not applying the correct BHC dressing. The BHC is cheap; the loss of a cane crop is costly.

Queensland cane growers in general react very quickly to a new agricultural practice or a progressive step in disease or pest control. It is not very often we meet with a grower who is so resistant to a well-proved measure that he is prepared to sacrifice his crop rather than his convictions. One cane farmer who has had three successive germination failures because he would not dip in Aretan, is still unconvinced—despite advice on each occasion that the failure was due to pineapple disease. It is a good thing for the industry that the majority of our growers are technically minded.

There is a surge of interest this year in the variety Q.64 in the Tully area. Plantings have been heavy. This new cane, bred at Meringa, is the result of a cross between Badila and Pompey, and is of the short, thick-stalked, type. These short, thick, canes are less common today than the taller, thinner, ones but there is a big demand for a replacement for Badila in the wet belt. Softness and ease of handling make Q.64 a good harvesting cane. On present indications we will hear a lot more of Q.64 in some of the far northern areas.

The World Distribution of Cane Diseases

By C. G. Hughes

At the Seventh Congress of the International Society of Sugar Cane Technologists, which was held in Brisbane in 1950, Mr. J. P. Martin, Principal Pathologist of the Hawaiian Sugar Experiment Station, presented a paper entitled "Sugar Cane Diseases and Their World Distribution". In the discussion which followed, the Section dealing with Cane Diseases prepared a resolution for submission to the Plenary Session for the establishment of a Standing Committee on cane diseases. Subsequently, the Committee was formed under the Chairmanship of Mr. Martin and now consists of the Chairman and representatives from 15 of the most important cane producing countries. This Committee is charged with the maintenance of an up-to-date listing of all sugar-cane diseases in every country.

This listing of diseases and their distribution could be of great value in research work into diseases of cane and in relation to the interchange of varieties, evaluation of resistance to disease and cane collecting expeditions. Its intelligent use might, for instance, point out the necessity for restrictions or for extra alertness in the transfer of varieties from one country to another or, from another angle, it might allow a freer exchange than normal.

This would be of interest chiefly to cane scientists and administrators, but the list in itself is of general interest to farmers everywhere as showing what diseases their crops may be exposed to and also recalling for them that most diseases do not affect their cane alone, but may also be costly blights in other countries.

In Table I the world distribution of all parasitic cane diseases recorded (although not necessarily still present) in Australia has been set out, and in Table II several diseases, which are not known to occur in Australia but have caused serious losses elsewhere, are listed. The revised listing of sugar cane diseases as presented to the I.S.S.C.T. Congress held in India in January, 1956, has been drawn upon for the compilation of the tables and due acknowledgment is made to that body.

TABLE I—The World Distribution of Cane Diseases which Occur in Australia

Common Name	*Scientific Name*	*Countries*	
Banded sclerotial disease	*Mycelia sterilia*	Australia Fiji Formosa	Java New Guinea Okinawa
Black rot ..	*Ceratostomella adiposum* (Butler) Sartoris	Australia Brazil Dominican Republic Formosa	India Java Peru U.S.A.
Brown stripe ..	*Cochliobolus stenospilus* (Carp.) Matsumoto et Yamamoto	Australia Brazil Cuba Dominican Republic Fiji Formosa Hawaii India Jamaica	Japan Mozambique Peru Puerto Rico Samoa South Africa U.S.A.
Cane killing weed	*Striga* spp.	Australia India Madagascar	Mauritius Nyasaland South Africa
Cane killing weed	*Thesium australe* R. Br. ..	Australia	

Common Name	*Scientific Name*	*Countries*	
Chlorotic streak	Virus	Australia	Java
		British Guiana	Martinique
		Colombia	Mauritius
		Dutch Guiana	Puerto Rico
		Fiji	St. Lucia
		Formosa	Samoa
		Grenada	Trinidad
		Guadeloupe	Turkey
		Hawaii	South Africa
		Jamaica	U.S.A.
Downy Mildew	*Sclerospora sacchari* Miy.	Australia	Japan
		Fiji	New Guinea
		Formosa	Philippines
		India	Thailand
Dwarf disease	Virus	Australia	
Eye Spot ..	*Helminthosporium sacchari* (v. Breda de Haan) Butler	Andaman Islands	Japan
		Antigua	Java
		Argentina	Kenya
		Australia	Madagascar
		Barbados	Madeira
		Belgian Congo	Malay States
		Brazil	Martinique
		British Guiana	Mauritius
		British Honduras	Mexico
		Cameroons	Mozambique
		China	New Guinea
		Colombia	Okinawa
		Costa Rica	Peru
		Cuba	Philippines
		Dominican Republic	Puerto Rico
		Dutch Guiana	Reunion
		Egypt	St. Kitts and Nevis
		Fiji	St. Lucia
		Formosa	St. Thomas
		Grenada	Sierra Leone
		Guadeloupe	South Africa
		Haiti	Tanganyika
		Hawaii	Thailand
		Honduras	Trinidad and Tobago
		India	Uganda
		Indo-China	U.S.A.
		Italy	Venezuela
		Jamaica	New Guinea
Fiji disease ..	Virus	Australia	Philippines
		Fiji	Samoa
		Madagascar	Solomon Islands
		New Britain	
		New Caledonia	
Gumming disease	*Xanthomonas vasculorum* (Cobb) Dows.	Antigua	Madeira
		Australia	Martinique
		Barbados	Mauritius
		Brazil	New Guinea
		British Honduras	Puerto Rico
		Colombia	Reunion
		Dominican Republic	St. Kitts and Nevis
		Fiji	St. Lucia
		Guadeloupe	St. Vincent
		Madagascar	
Iliau	*Gnomonia iliau*, Lyon ..	Australia	Hawaii
		Brazil	Philippines
		Cuba	U.S.A.

Common Name	*Scientific Name*	*Countries*	
Leaf scald ..	*Xanthomonas albilineans* ..	Australia	Indo-China
		Brazil	Java
		British Guiana	Madagascar
		Dutch Guiana	Mauritius
		Fiji	Philippines
		Formosa	Reunion
		Hawaii	
Mosaic	Virus	Andaman Is.	Java
		Angola	Kenya
		Argentina	Madagascar
		Australia	Madeira
		Barbados	Malay States
		Belgian Congo	Martinique
		British Honduras	Mexico
		Cameroons	New Guinea
		China	Nicaragua
		Colombia	Nyasaland
		Costa Rica	Okinawa
		Cuba	Paraguay
		Dominican Republic	Peru
		Dutch Guiana	Philippines
		Egypt	Puerto Rico
		El Salvador	Reunion
		Fiji	St. Kitts and Nevis
		Formosa	St. Thomas
		Guadeloupe	Sierra Leone
		Haiti	South Africa
		Hawaii	Tanganyika
		Honduras	Thailand
		India	Trinidad and Tobago
		Indo-China	Turkey
		Italy	Uganda
		Jamaica	U.S.A.
		Japan	Venezuela
Mottled stripe	*Xanthomonas rubrisubalbicans* Christopher et Edgerton	Australia	Nicaragua
		Colombia	Peru
		Fiji	Puerto Rico
		Guadeloupe	South Africa
		Jamaica	U.S.A.
		Martinique	
Pestalozzia leaf spot	*Pestalozzia fuscescens* Sor. var. *sacchari* Wakker	Australia	Java
		Cuba	Mauritius
		India	Philippines
Pineapple disease	*Ceratostomella paradoxa* (de Seynes) Dade	Antigua	Japan
		Argentina	Java
		Australia	Madagascar
		Barbados	Madeira
		Brazil	Mauritius
		British Guiana	Mexico
		British Honduras	New Guinea
		Colombia	Nicaragua
		Costa Rica	Okinawa
		Cuba	Paraguay
		Dominican Republic	Philippines
		Egypt	Puerto Rico
		Fiji	Reunion
		Formosa	St. Kitts and Nevis
		Guadeloupe	St. Lucia
		Hawaii	South Africa
		India	Trinidad and Tobago
		Indo-China	U.S.A.
		Jamaica	Venezuela

Common Name	*Scientific Name*	*Countries*
Pokkah boeng	*Gibberella fujikuroi* (Saw.) Wr. (*Fusarium moniliforme* Sheldon) (*Gibberella Moniliforme* Wineland)	Andaman Is. Angola Antigua Argentina Australia Barbados Belgian Congo Brazil British Guiana British Honduras Cameroons China Colombia Cuba Dominican Republic Dutch Guiana Egypt Fiji Formosa Grenada Guadeloupe Guam Haiti Hawaii Honduras India Indo-China Italy Jamaica Japan Java Kenya Madagascar Madeira Malay States Martinique Mauritius Mexico New Guinea Nicaragua Okinawa Paraguay Peru Philippines Puerto Rico Reunion St. Kitts and Nevis St. Lucia St. Thomas Samoa Sierra Leone South Africa Tanganyika Thailand Trinidad and Tobago Uganda U.S.A. Venezuela
Ratoon stunting disease	Undetermined	Antigua Australia Barbados Colombia Cuba Fiji Formosa Hawaii India Jamaica Kenya Mexico Mauritius Nicaragua Philippines Puerto Rico St. Kitts and Nevis South Africa Trinidad U.S.A.
Red rot	*Physalospora tucumanensis* (Went) Speg. (*Colletotrichum Falcatum* Went)	Angola Antigua Argentina Australia Barbados Brazil British Guiana British Honduras China Colombia Cuba Dominican Republic Egypt El Salvador Fiji Formosa Guadeloupe Guam Haiti Hawaii India Indo-China Jamaica Japan Java Madagascar Madeira Malay States Mauritius Mexico Mozambique New Guinea Nicaragua Okinawa Peru Philippines Puerto Rico Reunion St. Kitts and Nevis St. Lucia Samoa South Africa Thailand Trinidad and Tobag U.S.A.

To be continued

FREE SERVICES TO CANE GROWERS

The Bureau offers the following free services to *all* cane growers in Queensland:—

Soil Analysis and Fertilizer Recommendations

Your soil will be analysed by the most modern methods, and a report will be posted containing a recommendation covering the type of fertilizer required, the amount per acre, the need for lime, and other relevant information. Phone the nearest Bureau office and the soil samples will be taken as soon as possible.

Culture for Green Manure Seed

Cultures and instructions for the inoculation of the seed of cowpeas, velvet beans, mung beans or any other legume will be posted to any cane grower upon request to The Director, Bureau of Sugar Experiment Stations, Brisbane. Allow a week after receipt of your letter for the culture to be prepared and posted, but as the culture will easily keep a month or so it is a good idea to get your culture when you get your seed. If sowing is delayed, ask for another batch of culture; there is no charge.

Advice on All Phases of Cane Growing

The Bureau staff is at the service of all cane growers. They can best advise you on matters pertaining to varieties, fertilizers, diseases, pests, drainage and cultural methods. Bureau officers are available in every major cane growing district. A phone call will ensure a visit to your farm.